

Species Diversity, 1998, 3, 289–300

Pycnogonida of the Western Pacific Islands, XIV. A Shallow-water Collection from Tonga

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(Received 5 September 1997; Accepted 1 May 1998)

A small collection of Pycnogonida is reported from the Vava'u Island Group of the Tonga Islands, southwest Pacific. It contains 10 species in seven genera with one species, *Pycnogonum saxulum*, described and illustrated as new. The distribution of all species is given and each is compared with congeners known from the southwest Pacific.

Key Words: Pycnogonida, Pacific, Tonga Islands, Vava'u Group, taxonomy, new species.

Introduction

This small collection comes from a recent marine survey of several southwest Pacific islands in the Vava'u Island Group of the northern Tonga Islands. During a relatively short time, Smithsonian field workers and others gathered a large number of fish and gross bottom samples to be sorted later and identified in what would become a major contribution to knowledge of Tongan marine fauna. These sorted samples have provided a collection of 10 pycnogonid species, one of which, *Pycnogonum saxulum*, is described and illustrated as new.

There are only two known species of Pycnogonida from the island groups of Tonga. Calman (1923) identified a specimen as *Endeis mollis* (Carpenter, 1904) from Tongatapu. This specimen has been lost and is probably not the species Calman believed, as it was a female in a genus the females of which are very difficult to identify (Stock 1968; Clark 1973). There are no specimens of *Endeis* in this collection to assist in settling the problem of the Tonga species.

A second species was described as *Pallenopsis tongaensis* Clark, 1973. Its exact collecting locality was undesignated except for "Tonga". This species is one of the few known littoral-sublittoral members of a genus of species found more commonly in intermediate depths from shelf and slope. One of the 78 specimens in this report has been identified as Clark's species. The collection has been deposited in the National Museum of Natural History, Smithsonian Institution, and bears the catalog numbers of the old U. S. National Museum.

Ammonoidea Dohrn, 1881

Achelia Hodge, 1864

Achelia assimilis (Haswell, 1885)

Ammothaea assimilis Haswell, 1885:1026-1027, pl. LIV, figs 5-9.

Achelia assimilis. Child 1988a:2; 1990:312-313; 1991:138.- Stock 1994:32-33 [literature]. Child 1996:541.

Material: Sta. JTW93-35, Vava'u Group, Hunga Island, E shore, surge channels at undercut cave, 18°40'55"S, 174°06'05"W, 0-5.5m, rotenone using SCUBA, 15 Nov. 1993, 1 male, 1 female. Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 21°18'15"S, 174°26'20"W, 0-11 m, rotenone using SCUBA, 3 Nov. 1993, 1 male with eggs, 2 males, 1 female. Sta. JTW93-42, Vava'u Group, Ovake Island, NW side, surge channels among corals, 0.3-11 m, 18°44'31"S, 174°06'36"W, rotenone with SCUBA, 17 Nov. 1993, 2 males, 2 females, 1 juv.

Distribution: This species has been collected in many Southern Hemisphere localities: Australia, New Zealand, Chile, Argentina, Mozambique in southern Africa, and islands of the southern Indo-Pacific. There is little doubt that it can be called pan-Southern Hemispheric. Specimens are also found in a distributional extension into the Northern Hemisphere in Malaysia and the Philippines. A growing number of predominantly Southern Hemisphere genera and species are being discovered to have northerly representatives or populations in the Western Pacific corridor at least as far north as the Philippines and sometimes to Japan.

Remarks: This extremely variable species is reported in most faunal lists from Southern Hemisphere cold-water localities and from many temperate and some tropical sites.

Ammothella Verrill, 1900

Ammothella stauromata Child, 1982

Ammothella stauromata Child, 1982:271-273, fig 1; 1988a:5, 7.- Nakamura and Child 1988a:5-6; 1988b:809-810.- Müller 1989:125; 1990a:66; 1990b:106.- Child 1990:316.- Stock 1994:29.- Child 1996:544.

Material: Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 0-11m, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 3 Nov. 1993, 5 males with eggs, 2 males, 9 females, 7juv. Sta. JTW93-42, Vava'u Group, Ovake Island, NW side, surge channels among corals, 0.3-11m, 18°44'31"S, 174°06'36"W, rotenone with SCUBA, 17 Nov. 1993, 9 specimens. Sta. JTW93-44, Vava'u Group, Vava'u Island, Port Refuge on W side of island, reef top, spur and grooves, 0-6m, 18°38'23"S, 174°04'00"W, rotenone with SCUBA, 18 Nov. 1993, 1 female.

Distribution: This species was first described from Enewetak Atoll in the Marshall Islands. It has been collected since then in many Indo-West Pacific localities from Kenya to New Guinea, the Philippines, Fiji, American Samoa, and the Society Islands, all in depths of 0-6 m. The above collections add an additional island group to this list and increase the known depth for *A. stauromata* to 11m.

Remarks: This slender species is easily identified by its tall, narrow middorsal trunk tubercles, an uncommon character in this genus. The only other species with tall trunk tubercles known in the West Pacific is *A. thetidis* Clark, 1963, from eastern Australia. Clark's species has few other similarities with this species other than the dorsal tubercles.

One other species, *A. setosa* (Hilton, 1942), from the California coast, has tall trunk tubercles, but has other sharply pointed tubercles which do not conform to any found on *A. stauromata*. Other known species with tall or short trunk tubercles are also quite different from *A. stauromata* in multiple characters.

***Ascorhynchus* Sars, 1877**

***Ascorhynchus corderoi* d'B.-R. Marcus, 1952**

Ascorhynchus corderoi d'B.-R. Marcus, 1952:23-30, figs 1-9.- Stock 1953:304 [key]; 1965:14.- Weidner 1959:106 [list].- Child 1988b:52.- Stock 1992:82.

Material: Sta. JTW93-35, Vava'u Group, Hunga Island, E shore, surge channels at undercut cave, 18°40'55"S, 174°06'05"W, rotenone with SCUBA, 0-5.5 m, 15 Nov. 1993, 1 female.

Distribution: This rare species has one of the disjunct distributions found to be common among many pycnogonid species. The types were described from São Paulo, Brazil, and it has since been collected on Mauritius and in the Aldabra Islands of the Indian Ocean in shallow depths. It is found here in Tonga for the first time and is also new to the Pacific, giving it a much wider distribution around the Southern Hemisphere. This disjunct distribution is possibly a collecting artifact.

Remarks: This is an unusual species in a genus that sometimes displays strange and diverse characters for pycnogonids. Among these peculiarities, many species have anterior leg pairs that differ in minor or major morphology from the posterior pairs, and there are a few parasitic species in which some characters are reduced, discarded in evolution because they are not needed in such a relationship. The present species has another assortment of characters. In this genus it is the only known hermaphrodite (there is one apparent hermaphrodite and more than one known gynandromorph in the genus *Anoplodactylus*). It has both oocytes and cement glands in the legs of males. The above specimen, as a female, lacks any indication of these characters and has the typically smaller ovigers of this sex.

Marcus had 18 specimens of which nine were adult (eight carried eggs), and the female was not described if the single remaining adult specimen was of this sex. The present female is therefore the first to be compared with males. It is a very small specimen and has an ocular tubercle which is conspicuously taller and more erect than that of the type (Marcus, 1952:24, fig. 2). The conical median trunk tubercles are much lower and less pointed in the Tonga specimen, suggesting that they are sex-related, and its first scape segment does not have a dorsal tubercle as in Marcus's (1952) fig 3. This is in keeping with the generally less conspicuous armature carried by female pycnogonids. There are no ova in the legs of this specimen and the ovaries are indistinct. It compares well with the other characters as figured for the type, including its size.

***Tanystylum* Miers, 1879**

***Tanystylum bredini* Child, 1970**

Tanystylum bredini Child, 1970:296-299, fig. 3; 1977:441; 1988b: 52.- Müller 1989:125,

figs 11-21; 1990a:67, figs 7-15; 1992a:156, 159, figs 6-11.- Stock 1992:92-93; 1994:36-37.- Child 1996:546.

Material: Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 0-11 m, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 3 Nov. 1993, 2 males, 1 female. Sta. JTW93-44, Vava'u Group, Port Refuge on W side of Vava'u Island, spur and groove reef top, 0-6 m, 18°38'23"S, 174°04'00"W, rotenone with SCUBA, 18 Nov. 1993, 1 female.

Distribution: This species has a scattered distribution in the Indo-Pacific from African shores in Kenya and the coast of Oman to Aldabra Atoll, Sri Lanka, Indonesia, Malaysia, and the Society and Tuamotu Islands, in depths of 0-7 m. It is added herein in a locality between Malaysia and the Society Islands in slightly deeper water.

Remarks: This has become a controversial species because of variations among different populations, a situation similar to that of several other *Tanystylum* species. It is very closely related to *T. haswelli* Child, 1990 from the Australia-New Guinea area, and *T. orbiculare* Wilson, 1878 collected in many shallow, tropical-temperate localities around the world. The variation among the many known specimens designated as *T. orbiculare* suggests that not all belong to this species because these variations cross species lines in some characters. These include abdomen length and the angle at which it is carried, lengths of the palp's second and fourth segments, and differences in the oviger segments. Large suites of all three species must be examined before intelligent decisions on validity can be made.

Phoxichilidiidae Sars, 1891

Anoplodactylus Wilson, 1878

Anoplodactylus baldarus Child, 1988

Anoplodactylus baldarus Child, 1988b:56-59, fig 2.

Material: Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 0-11 m, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 3 Nov. 1993, 1 male with eggs, 2 males, 4 females. Sta. JTW93-44, Vava'u Group, Port Refuge on W side of Vava'u Island, spur and groove reef top, rotenone with SCUBA in 0-6 m, 18°38'23"S, 174°04'00"W, 18 Nov. 1993, 1 ovigerous female.

Distribution: Previously known only from the shallows of Aldabra Atoll, western Indian Ocean, but the present captures extend its range greatly to the east and into the midsection of the South Pacific at Tonga.

Remarks: These specimens show very little variation from the type's morphology. The one primary but inconspicuous difference is that most propodi of these seven specimens lack the tiny auxiliary claws of the type. There are sufficient auxiliary claws present on two or three specimens to confirm that the species does indeed have them, but for some reason the majority in hand lack these tiny lateral spikes. Perhaps they are lost from wear.

Anoplodactylus batangensis (Helfer, 1938)

Pycnosoma batangense Helfer, 1938:174-176, fig 6a-c.

Anoplodactylus batangensis.- Stock 1968:54 [older literature].- Child 1992:41-42 [recent literature], fig 18.- Müller 1992b: 47.- Stock 1994:54.- Child 1996:549.

Material: Sta. JTW93-42, Vava'u Group, Ovake Island, NW side, surge channels among corals, 18°44'31"S, 174°06' 36"W, 0.3-11 m, rotenone with SCUBA, 17 Nov. 1993, 2 males with eggs, 1 female, 1 juv.

Distribution: This is a pantropical shallow water species.

Remarks: The upcurved and tapered proboscis allows easy identification of this species among the wealth of species in this cumbersome genus. No other known species in the southern Pacific, nor almost any other, has such a tapered proboscis with such a sharp upturn at its base.

Anoplodactylus longiceps Stock, 1951

Anoplodactylus longicollis Williams, 1941:36-38, figs 2-5 [preoccupied].

Anoplodactylus longiceps Stock, 1951:16 [footnote]; 1956:97-98, fig 14c-d.- Clark 1963:4 [list], 55 [text].- Child 1975:20, fig 9f; 1990:331; 1991:144.- Stock 1994:61.

Material: Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 0-11 m, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 3 Nov. 1993, 2 males with eggs, 2 females. Sta. JTW93-44, Vava'u Group, Port Refuge on W side of Vava'u Island, spur and groove reef top, 0-6 m, 18°38'23"S, 174°04'00"W, rotenone with SCUBA, 18 Nov. 1993, 1 male with eggs.

Distribution: This colorful (often green) species has a wide north-south distribution from Western Australia and Queensland; to Sumatra, Indonesia, the Louisiade Archipelago, Papua New Guinea; and Guam in 0-134 m. The present capture extends its range to the east and further into the mid-Pacific, but within known depths.

Remarks: The four specimens from station 18 have green coloration as do several other specimens in the literature, but are without almost all legs. One male leg confirms that this species is one of the few in this large, unwieldy genus in which males have multiple cement gland outlets. It has two raised cups on each leg.

There are 21 known and more or less recognized species in this large genus with two or more cement gland openings placed dorsally on each femur. A list of males of these species is presented herein, giving the configuration and number of cement gland openings and other details (where needed) whereby males can be separated. It should be noted that at least 15 *Anoplodactylus* species are described, mostly in early literature, only from female specimens. For these, descriptions of male cement glands and other sexual characters remain unknown.

List of *Anoplodactylus* Species Known to Have Multiple Cement Gland Openings

(A). Cement glands with two openings per femur:

1. *A. dauphinus* Child, 1992. Two small, flask-shaped cups with openings pointing

distally.

2. *A. tenuicorpus* Child, 1991. Two large, slightly elevated, well separated, cribriform cups; trunk and appendages extremely attenuated, slender.
3. *A. longiceps* Stock, 1951. Two small, cribriform cups with elevated rims at midfemur, but species more compact and not as slender as *A. tenuicorpus*; distal tubercle on femora longer than segment diameter, small tubercles on first tibiae; lateral processes separated by more than their diameters.
4. *A. velamellus* Nakamura and Child, 1991. Two small cups proximally, short tubercle on femora, no tubercle on tibiae; lateral processes separated by their diameters; appendages of typical length.

(B). Cement glands with three to six openings per femur:

5. *A. dentimanus* Stock, 1979. Cement glands with three small, flat proximal pores; ovigers of five segments only.
6. *A. hokkaidoensis* (Utinomi, 1954). Three raised pores of the same size evenly spaced along most of femur dorsum, ovigers of six segments.
7. *A. stellatus* Nakamura and Child, 1983. Three raised pores of unequal size gathered toward proximal end of femur dorsum; proboscis with three laterodistal triangular tubercles.
8. *A. glandulifer* Stock, 1954. From two to five flask-shaped openings (usually 3-5) per femur, each with tiny tube; lateral processes well separated; ocular tubercle twice as tall as wide.
9. *A. angulatus* (Dohrn, 1881). From three to five flat proximal pores of differing sizes per femur; ovigers six-segmented.
10. *A. robustus* (Dohrn, 1881). From three to six flat or slightly elevated pores; proboscis cylindrical, with two anteriorly-pointing, ventrodistal tubercles; trunk unsegmented, ovigers of five segments.
11. *A. virescens* (Hodge, 1864). Three to six pores also; proboscis barrel-shaped, without tubercles; trunk with first two segmentation lines complete, ovigers five-segmented.
12. *A. oculatus* Carpenter, 1905. Openings comprising five tiny, raised, cribriform cups.
13. *A. pycnosoma* (Helfer, 1938). Five to eight transverse slits per femur, some with visible pores.

(C). Cement glands with seven to 10 openings per femur:

14. *A. bourboni* Müller, 1990b. Seven tiny raised tubes no longer than wide.
15. *A. australis* (Hodgson, 1914). Seven or eight simple, flat pores.
16. *A. xenus* Stock, 1980. Eight tiny, flat pores irregularly spaced and in an unaligned band along each femur.
17. *A. longiformis* Child, 1977. Eight to ten slightly raised, cribriform cups.

(D). Cement glands with more than 10 openings per femur:

18. *A. laciniosus* Child, 1995. Openings of 12 to 14 tiny pores mostly placed proximal to femur midpoint.
19. *A. cribellatus* Calman, 1923. Openings comprising 14 or 15 flat, cribellate pores.
20. *A. perforatus* Nakamura and Child, 1982. Openings composed of 17 to 25 crowded cribellate pores.

21. *A. simplex* Clark, 1963. From 22 to 30 tiny, inconspicuous pores present.

***Anoplodactylus pectinus* Hedgpeth, 1948**

Anoplodactylus pectinus Hedgpeth, 1948:234-236. fig 34.- Child, 1996:552 [literature].

Material: Sta. JTW93-41, Vava'u Group, Ovake Island, NW side, surge channels along rocky shore, 18°44'32"S, 174°06'36"W, 0.3-1.3 m, rotenone with SCUBA, 17 Nov. 1993, 1 male with eggs. Sta. JTW93-42, same area, surge channels among coral, 18°44'31"S, 174°06'36"W, 0.3-1.1 m, rotenone with SCUBA, 17 Nov. 1993, 3 males with eggs, 4 males, 2 females.

Distribution: This species appears to be pantropical in intertidal to 34 m depths, although it has yet to be collected along African coasts. It is known from many Indo-Pacific, western Atlantic, and Caribbean localities.

Remarks: This elongate, slender species is easily recognized by its prominent pectinate heel spines, a character confined to very few members of this genus.

Callipallenidae Hilton, 1942

Pallenopsis Wilson, 1881

Subgenus ***Pallenopsis*** Stock, 1975

***Pallenopsis (Pallenopsis) tongaensis* Clark, 1973**

Pallenopsis tongaensis Clark, 1973:28-30, fig. 1.

Material: Sta. JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 0-11 m, 3 Nov. 1993, 1 male with eggs.

Distribution: This species is only known from the male type specimen captured in "Tonga". This second capture record gives it an unusually shallow depth range but continues to confine the species to Tonga. It will probably prove to have a wider distribution when more is known about the shore fauna of SW Pacific islands.

Remarks: This is one of the rarer members of the genus, probably because of the lack of collections from this part of the Pacific. Rarity also suggests that it has a rather restricted distribution. The majority of species in this subgenus are collected in deeper waters of the shelf and slope while very few are found in such shallow waters.

This specimen is without legs but is readily identified as *P. tongaensis* because of its compact habitus and closely spaced lateral processes, its rather short ovigers, and the uncommonly long abdominal setae or spines. The figures given by Clark show the legs as short with a ventral femoral cement gland tube of about half the femur diameter.

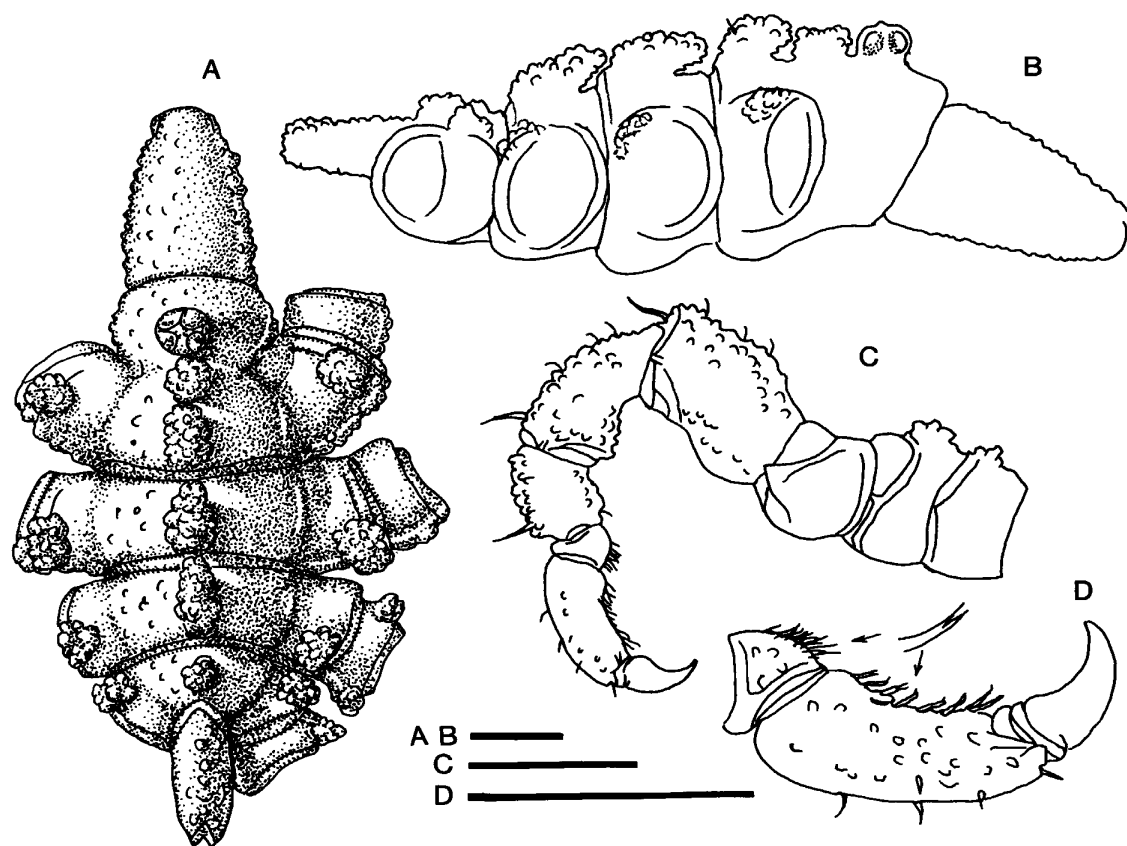


Fig. 1. *Pycnogonum saxulum*, new species. holotype female, A, trunk, dorsal view; B, trunk, lateral view; C, third leg; D, distal leg segments, enlarged. Bars=0.3mm

Pycnogonidae Wilson, 1878
Pycnogonum Brünnich, 1764
Pycnogonum saxulum new species
 (Fig 1)

Material: JTW93-18, Vava'u Group, Eua Island, NW shore, spur and groove reef at cliff base, 21°18'15"S, 174°26'20"W, rotenone with SCUBA, 0-11m, 3 Nov. 1993, 1 female (holotype, USNM 284326), 1 juv. (paratype, USNM 284327).

Distribution: Known only from the type locality, Eua Island, Vava'u Group of the Tonga Islands, in 0-11m.

Description: Size very small for the genus, leg span about 5mm. Entire surface except segmentation lines with irregularly pebbled surface. Trunk robust, with two tubercles on mediandorsal line of ocular segment posterior to ocular tubercle, anterior tubercle smaller than posterior one. Remaining three segments with single tubercle each, that of posterior segment half as large as those of anterior segments. Lateral processes very short, closely crowded, with single low, posterodistal tubercle. Ocular tubercle not taller than its width nor taller than median tubercles. Proboscis fairly short, barrel-shaped, tapering distally to narrow mouth opening. Abdomen short, a narrow oval in dorsal view, slightly rectangular in lateral view, extending only little beyond first coxae of fourth leg pair.

Chelifores, palps, and ovigers lacking.

Legs very short, robust; coxae broad, hardly longer than their diameters, glabrous. Femora less than twice longer than their diameters, with a low proximoventral bulge, having few very short dorsal setae; longer dorsodistal seta on all major segments. First tibiae twice length of second, curved at right angles ventrally, diameter increasing distally. Second tibiae semirectangular, only slightly longer than their diameters, shorter than propodi. Tarsus very short, propodus broad proximally, tapering distally, with few short, simple dorsal setae, both segments armed with many short sole spines having bifurcate tips. Claw robust, short, well curved, without auxiliaries.

Male characters unknown.

Measurements (holotype in mm): trunk length (proboscis dorsal insertion to tips of fourth lateral processes), 1.78; trunk width (across second lateral processes), 1.2; proboscis length, 0.7; abdomen length, 0.47; third leg, coxa 1, 0.22; coxa 2, 0.16; coxa 3, 0.17; femur, 0.37; tibia 1, 0.31; tibia 2, 0.19; tarsus, 0.07; propodus, 0.3; claw, 0.16.

Etymology: The name (Latin: *saxulum*, diminutive of *saxum*, meaning rock or rocky) refers to the row of rocky-appearing or pebbly midline trunk tubercles.

Remarks: This species has many similarities to the recently described *Pycnogonum asiaticum* Müller, 1992a. The latter has a pebbled body surface, but the pebbles sometimes contain tiny, sharply pointed spikes, unlike the simple bumps of the new species. The trunk dorsum of both species has two cephalic segment tubercles and a single tubercle on each of the remaining three segments, and an ocular tubercle is only as tall as the dorsal trunk tubercles. The lateral processes are separated distally in *P. asiaticum* by at least a quarter of their diameters and bear a dorsodistal tubercle while those of *P. saxulum* are barely separated distally and bear a low tubercle on the posterolateral surface. The proboscides and abdomina of both species are very similar while the leg segments of *P. asiaticum* are distinctly longer than those of *P. saxulum*. The ovigers can not be compared for lack of a male specimen of the new species. The principle difference between the two species is that the auxiliary claws of *P. asiaticum* are large and conspicuous while *P. saxulum* lacks any form of auxiliaries.

Acknowledgments

I wish to thank Jeffrey T. Williams, principal investigator, Smithsonian Institution, and his collecting team for providing these specimens for examination and identification. Their efforts in the field were significantly aided by National Geographic Society grant 4956-93, which is gratefully acknowledged.

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